L 39292-65

ACCESSION NR: AP5010079

ASSOCIATION: Institut tekhnicheskoy fiziki AN UkrSSR, Kiev (Institute of Technical Physics, AN UkrSSR)

SUBMITTED: 26May64

ENCL: 00

SUB CODE: PR, MG

NO REF SOV: 010

OTHER: 001

ATD PRESS: 3226

Card 2/2

L 21577-66 EWT(1)/EWP(m)/EWA(1) WW/GS
ACC NR: AT6008143 SOURCE CODE: UR/0000/65/000/000/0042/0047

AUTHOR: Dorfman, A. Sh. (Candidate of technical science)

47
B+1

ORG: none

TITLE: Concerning a method for calculating a laminar boundary layer

SOURCE: AN UkrSSR. Techeniya zhidkostey i gazov (Flows of liquids and gases). Kiev, Naukova dumka, 1965, 42-47

TOPIC TAGS: hydrodynamics, laminar boundary layer, boundary layer, boundary layer separation, boundary layer thickness

ABSTRACT: After a brief review and critique of available methods for calculating a laminar boundary layer in the retarded region, the author develops a simplified method of solution which makes it possible to reduce the determination of boundary layer parameters by means of the methods developed by L. Howarth and by Kochin-Loytsyanskiy to simple quadratures. Moreover, the determination of boundary layer characteristic thicknesses does not necessitate the knowledge of velocity derivatives, and only the determination of the first velocity derivative will be needed for computing the values of the parameter $U' \delta^{**2}/\nu$. A comparison of the results from using the formulas obtained by Kochin-Loytsyanskiy and Holstein-Bohlen shows that the expressions

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2

ACC NR: AT6008143

for δ^{**}, the boundary layer momentum thickness, differ very slightly, which means that the distribution of boundary layer thicknesses depends weakly on the shape of velocity profiles in the boundary layer, even for retarded motions. But, substantial discrepancies are observed in the values of the parameter $U'\delta^{**2}/\nu$ at the point of separation, as calculated by various methods. Those obtained by Kochin-Loytsyansky and Howarth are substantially more consistent with experimental data. Orig. art. has: 2 figures and 8 formulas. [AB]

SUB CODE: 20/ SUBM DATE: 19Aug64/ ORIG REF: 003/ OTH REF: 002
ATD PRESS: 4219

Card 2/2 ULR

L 26505-66 EWP(m)/EWT(1) GS

ACC NR: AT6008147 UR/0000/65/000/000/0072/0080 36 B+1

AUTHOR: Saykovskiy, M.I.; Dorfman, A.Sh. (Candidate of technical sciences); Didenko, O.I.; Kusyuk, A.I.; Stepanenko, A.P.

ORG: None

TITLE: Results of aerodynamic investigation of the compressor intake on models and in full scale

SOURCE: AN UkrSSR. Techeniya zhidkostey i gazov (Flows of liquids and gases) Kiev, Naukova dumka, 1965, 72-80

TOPIC TAGS: compressor design, aerodynamic test, test model

ABSTRACT: The paper describes scale model and full scale aerodynamic tests on compressor intakes. Rigidly oriented 3-channel total pressure tubes installed in a rotatable ring were used to measure the flow turning angle, velocity, and total air pressure. Schematics of the compressor intake are shown. The energy loss coefficient, ξ, of the intake was calculated from the average loss of total pressure, Δ_0, the average ram density, ρ, the average normal velocity, v_n, and the compressibility correction factor δ ($\delta = 1 - M^2/4$) using: $\xi = 2\Delta_0/\rho_0 \cdot v_n$. (1) Conditions and measurement results are given for 12 design variants. All variants show a fairly uniform distribution of velocities over the cross sections. Losses are comparatively low in all variants, somewhat 2

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L 26505-66

ACC NR: AT6008147

lower for the design with a diagonally disposed entrance. Hints for efficient compressor intake design are discussed, among them the necessity to have adequate overall axial dimensions so as not to increase unduly the curvature at flow bends. Model tests have indicated a sufficiently close correspondence of the flow rotation angles and velocity distributions with the full scale data. Orig. art. has: 4 figures, 1 formula.

SUB CODE: 13/ SUBM DATE: 01Sep64

Card 2/2

L 23034-66 EWP(m)/EWT(1)/EWA(1) RM/WW

ACC NR: AP6010031 SOURCE CODE: UR/0170/66/010/003/0298/0305

57
B

AUTHOR: Dorfman, A. Sh.

ORG: Institute of Technical Thermophysics, AN UkrSSR, Kiev (Institut tekhnicheskoy teplofiziki AN UkrSSR)

TITLE: Approximate solution to the internal problem of the theory of a laminar boundary layer, laminar flow

SOURCE: Inzhenerno-fizicheskiy zhurnal, v. 10, no. 3, 1966, 298-305

TOPIC TAGS: laminar boundary layer, integration, flow analysis, axisymmetric flow, approximate solution, numeric integration, axisymmetric body

ABSTRACT: An analysis has been made of the problem of a laminar boundary layer taking into account the interaction of the boundary layer and core of the flow for an arbitrarily shaped duct. Several equations were reduced to a single integrodifferential equation. Numerical integration resulted in formulas for determining coordinates of separation and convergence points of the layers. A simple approximate method is suggested for calculating the boundary layer, taking into account its effect on the main stream for plane or axisymmetrical ducts. [NT]

SUB CODE: 20 SUBM DATE: 29May65/ ORIG REF: 005/ OTH REF: 003

Card 1/1 UDC: 532.517.2

L 34348-66 EWT(1)/EWP(m) RM/WW

ACC NR: AP6021550 SOURCE CODE: UR/0198/66/002/006/0112/0121

38
B

AUTHOR: Dorfman, A. Sh. (Kiev)

ORG: none

TITLE: An approximate method of integrating the laminar boundary layer equation

SOURCE: Prikladnaya mekhanika, v. 2, no. 6, 1966, 112-121

TOPIC TAGS: gas dynamics, laminar boundary layer, boundary layer, boundary layer flow

ABSTRACT: An approximate method for calculating the laminar boundary layer is developed in order to obtain its velocity distributions. It is based on the linearization of the boundary-layer equation of the Mises form. The results of the analysis were applied to two cases when the velocity variation in the external flow obeys the power $U = x^m$ and linear $U = 1 - bx$ laws, respectively. Comparison of the results obtained by this method with the exact theoretical data shows good agreement in the case of a flow with relatively small pressure gradients while the discrepancies increase with increasing pressure gradients. [AB] Orig. art. has: 5 figures, 36 formulas, and 1 table.

SUB CODE: 20/ SUBM DATE: 14Jul65/ ORIG REF: 003/ OTH REF: 001
ATD PRESS: 5033

Card 1/1

L 45137-66 EWT(1)/EWP(m)

ACC NR: AP6020379 (A) SOURCE CODE: UR/0114/66/000/006/0029/0031

AUTHOR: Dorfman, A. Sh. (Candidate of technical sciences) 31

ORG: none

B

TITLE: Calculation of loss of total pressure in diffuser channels

SOURCE: Energomashinostroyeniye, no. 6, 1966, 29-31

TOPIC TAGS: diffuser design, pressure measurement

ABSTRACT: To evaluate the loss in diffusers of complicated configuration with curvilinear generatrices, use is generally made of the concept of an equivalent conical diffuser, assuming that the losses in the curvilinear diffuser will be equal to the losses in an equivalent conical diffuser with an angle of expansion θ eq (See Fig. 1).

Card 1/2 UDC: 62-225.001.2

L 45137-66

ACC NR: AP6020379

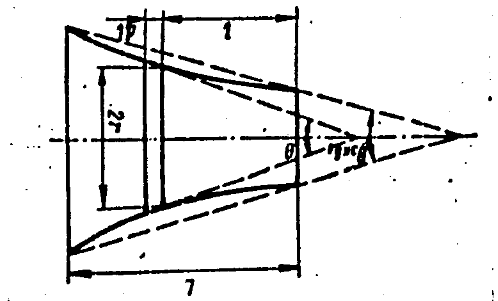

Fig. 1. Curvilinear diffuser

The expression for the local angle of expansion of a curvilinear axisymmetric diffuser, tan Θ /2 = dr/dl, can be generalized in the following form for the case of a diffuser of arbitrary form:

$$\mathrm{tg}\,\frac{\theta}{2}=\frac{dF}{ds}=\frac{1}{U}\cdot\frac{dF}{dl}, \qquad (3)$$

where F is the area of a transverse cross section; S is the surface of the diffuser. The generalized equations developed in the article are confirmed by experimental data from the literature. Orig. art. has: 9 formulas and 2 figures.

SUB CODE: 20/ SUBM DATE: none/ ORIG REF: 010

Card 2/2 ULK

DORFMAN, B.

Labor productivity in transporting products of metallurgical and pipe plants and methods for measuring it. Biul. nauch. inform.: trud i zar. plata 3 no. 11:15-17 '60. (MIRA 14:1)
(Pipe) (Metallurgical plants)
(Railroads--Freight--Labor productivity)

DORFMAN, B.; FAIVISHENKO, L.

Methodology for calculating the increase of workers' productivity in the railroad workshops of metallurgical plants taking the expansion of production into consideration. Biul.nauch.inform.: trud i zar. plata 4 no.6:20-25 '61. (MIRA 14:6)
(Steel industry) (Railroads, Industrial—Labor productivity)

MINENKO, V.A. (Khar'kov); DORFMAN, B.A. (Khar'kov)

Organization of the work of the railroad transportation departments in metallurgical plants. Zhel. dor. transp. 47 no.9:84-86 S '65.
(MIRA 18:9)

1. Direktor Vsesoyuznogo nauchno-issledovatel'skogo instituta organizatsii proizvodstva i truda chernoy metallurgii (for Minenko).

DORFMAN, B. A.

PA - 2384

AUTHOR: GENESIN, A.M., DORFMAN, B.A., and POPLAVSKIY, P.M.

TITLE: About the Accounting of the Railway Transportation Net Cost at the Metallurgical Works. (Ob ucheta sebestoimosti perevozok na zheleznodorozhnom transporte metallurgicheskikh zavodov, Russian).

PERIODICAL: Stal', 1957, Vol 17, Nr 1, pp 76 - 79 (U.S.S.R.) Reviewed: 5 / 1957
Received: 5 / 1957

ABSTRACT: Freight turnover within an iron production plant comprises goods delivered to the works, transport within the premises of the plant, and outgoing freight. The costs of transport of a work amount to about 4 to 4,5 % of the entire production costs. The problem of the net costs for transports by rail within the premises of the work has hitherto not been investigated with sufficient thoroughness. At present the ton kilometer serves as a basis for calculations. It is shown that this is not the right basis and that the real rate of expenditure for all costs of transport can only to be ascertained if these expenses are referred to the total tonnage transported including those outside the works. This calculation is possible by means of the following formula:

$$K = p\Sigma P + q\Sigma Pl$$

K denotes the net costs of the transport, P - the amount of the tonnage transported, p - the expenses for initial- and final operations per ton, ΣPl - the amount of tons kilometer attained in the case of transports, q - expenses for the transport

Card 1/2

PA - 2384

About Accounting of the Railway Transportation Net Cost at the Metallurgical Works.

of 1 ton per 1 km. Calculations in 7 large works showed that net costs for the transport of 1 ton vary between Rb 1.41 in the combine of Kuznetsk, and Rb 2.08 at the Novo-Tagil' plant. (2 tables and 2 illustrations).

ASSOCIATION: The All-Union Scientific Research Institute for the Production- and Working Organization for the Production of Iron.
PRESENTED BY:
SUBMITTED:
AVAILABLE: Library of Congress.
Card 2/2

DORFMAN, B. A.

TRUZHENKO, M.F.; DORFMAN, B.A. (g.Makeyevka)

Cooperative production in industrial transport. Zhel. dor. transp. 40 no.1:28-29 Ja '58. (MIRA 11:1)

1.Nachal'nik zheleznodorozhnogo tsekha Makeyevskogo metallurgicheskogo zavoda (for Truzhenko). 2. Nachal'nik laboratorii promyshlennogo transporta Vsesoyuznogo nauchno-issledovatel'skogo instituta organizatsii promyshlennosti chernoy metallurgii (for Dorfman).
(Railroads--Management)

DORFMAN, B.A., inzh., nauchnyy sotrudnik; FAYVISHENKO, L.I., inzh., nauchnyy sotrudnik; KHAZANOVICH, N.L., inzh., nauchnyy sotrudnik; KHALIN, P.G., inzh., nauchnyy sotrudnik; PEYCHEV, G.P., otv.red.; BELINA, R.A., red.izd-va; ANDREYEV, S.P., tekhn.red.

[Track maintenance at iron and steel mills] Opyt raboty puteitsev zheleznodorozhnogo transporta predpriiatii chernoi metallurgii. Khar'kov, Gos.nauchno-tekhn.izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1959. 101 p. (MIRA 12:10)

1. Kharkov. Vsesoyuznyy nauchno-issledovatel'skiy institut organizatsii proizvodstva i truda chernoy metallurgii. 2. Vsesoyuznyy nauchno-issledovatel'skiy institut organizatsii proizvodstva i truda chernoy metallurgii.(for Dorfman, Fayvishenko, Khazanovich, Khalin).
(Railroads, Industrial) (Railroads--Track)

BELOSTOTSKIY, A.A., inzh.; DORFMAN, B.A., inzh.

[redacted]

Automatic control of railroad transportation in iron and steel works. Mekh. i avtom. proizv. 17 no.5:8-9 My '63. (MIRA 16:6)

(Magnitogorsk—Railroads, Industrial—Electronic equipment)

DORFMAN, B.M.; DRYLOV, R.A.

Device for determining the effect of inclination on the readings of electric instruments. Izm.tekh. no.8:53-54 Ag '62.
(MIRA 16:4)
(Electric instruments--Testing)

DORFMAN, E.

Comparative study of the measuring methods of capacities and fluid quantities in industry. Metrologia apl 10 no.12: 536-538 D '63.

DORFMAN, E.

Use of pressure tubes for flow measurements. Metrologia apl 11 no.3:117-122 Mr'64.

DORFMAN, E., arkhitektor

When the principle of efficiency is violated. Okhr. truda i sots. strakh. 6 no.12:29-30 D '63. (MIRA 17:2)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R000410930009-5"

L 52310-65 EWT(m)/EWP(i)/EWP(t)/EWP(b) JD

AP5008806 S/0080/65/038/003/0534/0537

..., V. I.; Denisov, A. I.; Peshkov, ... L. M.

... of the addition of certain salts on the rate of chemical plating

... prikladnoy khimii, v. 38, no. 3, ...

... plating, nickel, additive, reagent ...

... chemical nickel plating is widely used because it gives hard and uniformly thick nickel coatings on irregularly shaped metal articles. The effect ... in the starting reagents, water and electrolyte material as ... arise during ... plating ... rate of chemi- ... investigated. ...

Card 1/2

L 23[illegible]-65

ACCESSION NR: AP5008806

[illegible] decomposition of sodium polyphosphate. Ammonium sulfate up to a concentration of [illegible] grams per liter does affect the rate of the nickel [illegible]. Ammonium fluoride accelerates the nickel plating process but the obtained nickel platings were of inferior quality. The impurities commonly present in commercial nickel [illegible] alter the normal mode of the nickel plating process. Commercial [illegible] with sodium [illegible] the proc- [illegible] however, [illegible] [illegible] tables.

ASSOCIATION: none

SUBMITTED: 26Apr63 ENCL: 00 SUB CODE: MM

NO REF SOV: 008 OTHER: 000

LL
Card 2/2

ZUBKOV, I.D.; DORFMAN, E.M. [Dorfman, IE.M.]

Application of ultrasonic waves in the study of the mechanical properties of glass textolits. Khim.prom. [Ukr.] no.2:9-10 Ap-Je '65. (MIRA 18:6)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R000410930009-5"

DORFMAN, Emmanuil Yefimovich, inzh.; SINTSEROV, Arkadiy Dmitriyevich, inzh.; OTSEP, S.A., kand. tekhn.nauk, red.; KRIVYAKIN, B.I., red.; GOLUBKOVA, L.A., tekhn.red.

[Heating and ventilating flour and groat mills] Otoplenie i ventiliatsiia mel'nits i krupianykh zavodov. Pod red. S.A.Otsepa. Moskva, Izd-vo tekhn. i ekon. lit-ry po voprosam mukomol'no-krupianoi, kombikormovoi promyshl. i elevatorno-skladskogo khoziaistva, 1957. 261 p. (MIRA 11:2)

(Heating) (Ventilation) (Flour mills)

KUCHINSKIY, M.; DORFMAN, F., tekhnolog; SEREBRYANNIKOVA, Kh., kand.khimicheskikh nauk; ~~BER, V., inzh.~~; SHCHEBANOV, P.; POLYAKOV, V., ratsionalizator (Sverdlovsk)

New developments in factories. Mest.prom.i khud.promys. 1 no.2/3: 36 N-D '60. (MIRA 14:4)

1. Direktor fabriki "Kommunar", Orsha (for Kuchinskiy). 2. Fabrika "Rezinoprom" (for Dorfman). 3. Direktor fabriki "Shchetochnik, Rostov (for Shchebanov).

(Manufacture—Technological innovations)

KRIVORUCHKO, Semen Semenovich; DORFMAN, G.A., otv. red.; KAMINSKIY, L.N., red. izd-va; ANDREYEV, S.P., tekhn. red.

[Operator of a coke-pushing machine; manual for on-the-job training of qualified workers] Mashinist koksovytalkivatelia; uchebnik dlia podgotovki kvalifitsirovannykh rabochikh na proizvodstve. Khar'kov, Gos.nauchno-tekhn. izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1961. 173 p. (MIRA 14:6)
(Coke industry—Equipment and supplies)

DORFMAN, G.A.

Testing the bracing of the brickwork of coke oven batteries. Koks i khim. no.1:23-27 '63. (MIRA 16:2)

(Coke ovens—Testing)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R000410930009-5"

SICHENKO, V.K.; IVANOV, B.V.; POLYAKOV, I.I.; REZNIKOV, A.A.; DORFMAN, G.A.; IZRAELIT, E.M.; KOTYCH, A.G.; TOPYGIN, L.A.; CHALYY, G.Ya.; STETSENKO, Ye.Ya.; UDOVICHENKO, L.V.; FILIPPOV, B.S., nauchn. red.; LERNER, R.Z., nauchn. red.; GOL'DIN, Ya.A., glav. red.; KULESHOV, M.M., red.; POLOTSK, S.M., red.

[By-product coke industry] Koksokhimicheskoe proizvodstvo. Moskva, Metallurgiia, 1965. 167 p. (MIRA 18:7)

1. TSentral'nyy nauchno-issledovatel'skiy institut informatsii i tekhniko-ekonomicheskikh issledovaniy chernoy metallurgii. 2. Direktor TSentral'nogo nauchno-issledovatel'skogo instituta informatsii i tekhniko-ekonomicheskikh issledovaniy chernoy metallurgii (for Kuleshov).

TAYTS, Ye.M., doktor tekhn. nauk; SHVARTS, S.A., kand. tekhn. nauk[deceased]; PEYSAKHZON, I.B., inzh.; GEL'FER, M.L., inzh.; DMITRIYENKO, M.T., inzh.; DORFMAN, G.A., inzh.; IZRAELIT, Ye.M., inzh.; KULAKOV, N.K., inzh.; KUSHLYANSKIY, B.S., inzh.; MEYKSON, L.V., inzh.[deceased]; LEONOV, A.S., inzh.; SHVARTS, G.A., inzh.; SHVARTSMAN, I.Ya., inzh.; YATSENKO, N.Ya., inzh.; BABIN, P.P., inzh.; KHANIN, I.M., doktor tekhn. nauk, prof., red.; KOZYREV, V.P., inzh., red., KUPERMAN, P.I., inzh., red.; LGALOV, K.I., inzh., red.; LEYTES, V.A., inzh., red.; LERNER, B.Z., inzh.,red.; POTAPOV, A.G., inzh., red.; SHELKOV, A.K., red.

[By-product coke industry worker's handbook in six volumes] Spravochnik koksokhimika v shesti tomakh. Moskva, Metallurgiia. Vol.2. 1965. 288 p. (MIRA 18:8)

DORFMAN, G.S., inzh.; KOZACHENKO, V.G.; MARKOV, A.N.

Over-all mechanization of paper roll reloading. Mekh.i avtom. proizv. 18 no.2:21-24 F '64. (MIRA 17:4)

EXCERPTA MEDICA Sec.11 Vol.10/10 Oto-Rhino-Laryngo Oct.,
DORFMAN, G. V.

1936. GREENBERG G.I., DORFMAN G.V. and VISLENEVA M.G. Leningrad. *Tables of Russian words used in clinical hearing-tests by the speech audiometer (Russian text) VESTN.OTO-RINO-LARING. 1957, 3 (78-83)

Two tables of Russian words are offered for speech audiometry. The first table contains sounds of low frequency, the second - of average and high frequencies. In order to eliminate guessing, both tables are of monosyllabic words only. These tables are aimed at clinical use in the differential diagnosis of the type of deafness, following the course of a disease and the effectiveness of the therapeutic methods used. Discernment of speech in both tables is evaluated in percentage and depends on the intensity of sounds.

DORFMAN, K.E.; ALEKSINA, S.M., meditsinkaya sestra

Mass work of a library. Med.sestra 21 no.8:58 Ag '62. (MIRA 15:9)

1. Zaveduyshchaya bibliotekoy Infektsionnoy bol'nitsy imeni S.P.Botkina v Leningrade (for Dorfman).
(NURSES AND NURSING)

BENDERSKIY, S.N., kand. tekhn. nauk; BURSIAN, V.R., prof., kand. tekhn. nauk; VASIL'YEV, P.N., inzh.; DORFMAN, E.Ye., inzh.; ZHURAVLEV, V.F., kand. tekhn. nauk; KESTEL'MAN, V.N., inzh.; KRUGLOV, A.N., dots., kand. tekhn. nauk; KUKIBNYY, A.A., dots., kand. tekhn. nauk; LEVACHEV, N.A., dots., kand. tekhn. nauk; LEYKIN, A.Ya., inzh.; NAREMSKIY, N.K., dots., kand. tekhn. nauk; PLATONOV, P.N., prof., doktor tekhn. nauk; SOKOLOV, A.Ya., prof., doktor tekhn. nauk; KUTSENKO, K.I., kand. tekhn. nauk, dots., retsenzent; VEREMEYENKO, Ye.I., inzh., retsenzent; KOVTUN, A.P., inzh., retsenzent; SEMENYUK, A.I., retsenzent; KASHCHEYEV, I.P., inzh., retsenzent; PAL'TSEV, V.S., kand. tekhn. nauk, retsenzent; KHMEL'NITSKAYA, A.Z., red.

[Conveying and reloading machinery for the overall mechanization of the food industries] Transportiruiushchie i peregruzochnye mashiny dlia kompleksnoi mekhanizatsii pishchevykh proizvodstv. Moskva, Pishchevaia promyshlennost', 1964. 759 p. (MIRA 18:3)

(Continued on next card)

BENDERSKIY, S.N.--- (continued). Card 2.

1. Odesskiy tekhnologicheskiy institut imeni M.V.Lomonosova (for Kutsenko, Naremskiy, Veremeyenko, Kovtun). 2. Starshiy ekspert Upravleniya po avtomatizatsii i oborudovaniyu dlya pishchevoy promyshlennosti Gosudarstvennogo komiteta po mashinostroyeniyu pri Gosplane SSSR (for Semenyuk). 3. Glavnyy mekhanik Gosudarstvennogo instituta po proyektirovaniyu predpriyatiy mukomol'nokrupyanoy i kombikormovoy promyshlennosti i elevatorno-skladskogo khozyaystva (for Kashcheyev). 4. Zaveduyushchiy laboratoriyey Vsesoyuznogo nauchno-issledovatel'skogo instituta zerna i produktov ego pererabotki (for Pal'tsev).

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R000410930009-5"

SHENDERET, Ye.R.; IVANOVSKIY, F.P.; Prinimali uchastiye: TYURINA, L.S.; SERGEYEVA, L.Ye.; DORFMAN, I.M.

Solubility of acetylene in acetone at low temperatures. Zhur. prikl.khim. 37 no.7:1557-1562 Jl '64.

(MIRA 18:4)

DORFMAN, L. A.

Mathematical Reviews
Vol. 14 No. 9
October 1953
Mechanics

Dorfman, L. A. Computation of irrotational flow about grids of profiles and construction of grids for given velocity distribution on the profiles. Akad. Nauk SSSR. Prikl. Mat. Meh. 16, 599–612 (1952). (Russian)

Let $z(\zeta)$ map the grid of flat plates at $\eta=m\pi$ ($m=0, \pm 1, \pm 2, \cdots$), $|\xi| \leq a$, in the $\zeta=\xi+i\eta$ plane onto a given grid of congruent equally spaced airfoils in the $z=x+iy$ plane. The potential function for incompressible flow about plane grids being known, the potential for the given grid can be found by constructing $z(\zeta)$ as follows. For a periodic analytic function $F(\zeta)$ bounded at infinity the limits $F_+(\xi_0)$ and $F_-(\xi_0)$ obtained by approaching the point $\zeta=\xi_0$ of a slit satisfy

$$\pi i[F_+(\xi_0)+F_-(\xi_0)]=\int_{-a}^{a}[F_+(\xi)-F_-(\xi)]\coth(\xi-\xi_0)d\xi,$$

which can also be inverted to yield F_+-F_- in terms of F_++F_-. Application of these relations to $z(\zeta)-\zeta$ yields

$$2\pi[x_\pm(\xi_0)-\xi_0]=\int_{-a}^{a}[y_+(\xi)-y_-(\xi)]\coth(\xi-\xi_0)d\xi$$

$$\pm(\cosh^2 a-\cosh^2 \xi_0)^{\frac{1}{2}}\int_{-a}^{a}[y_+(\xi)+y_-(\xi)]$$

$$\times(\cosh^2 a-\cosh^2 \xi)^{-\frac{1}{2}}/\sinh(\xi-\xi_0)d\xi$$

and $y_{\pm}$ can be expressed similarly in terms of $x_{\pm}$. The author suggests solving these equations by an iterative scheme. The integrations are performed numerically after making the transformation $\tanh \xi = \tanh \alpha \cos \theta$ and approximating integrands by trigonometric polynomials. A scheme devised by L. Simonov [same journal 11, 69–84 (1947); these Rev. 9, 541] for airfoil computations is applied to accelerate convergence. Calculations for a particular profile show good agreement with test data. The author also discusses specializations for grids of high solidity and the construction of grids with velocity distributions prescribed as functions of arc length on the profiles.

J. H. Giese.

FD-957

DORFMAN, L. A.

USSR/Mathematics - Hydrodynamics, Cascade profiles

Card 1/1 Pub. 85-11/11

Author : Dorfman, L. A.

[redacted]

Title : Inverse problem of cascade profiles

Periodical : Prikl. mat. i mekh. 18, 637-640, Sep/Oct 1954

Abstract : Practical application of G. Yu. Stepanov's method (PMM, Vol 16, No 6 (1953)) for the establishment of cascade profiles is attempting by solving the inverse problem. Considering the velocity distribution on the profile surface as specified, the author computes the corresponding profile shape. In the particular case where the velocity distribution agrees with parameters of the distant flow, but leads to a cascade design with a quite different velocity distribution, the method presented provides an accurate solution. Three references.

Institution : --

Submitted : June 8, 1954

DORFMAN, L. A.

Dorfman, L. A. -- "Direct and Inverse Problems in the Hydrodynamic Theory of Lattice Sections." Min Higher Education USSR, Leningrad Polytechnic Inst imeni M. I. Kalinin, Leningrad, 1955. (Dissertation for the Degree of Candidate in Physico-mathematical Sciences.)

SO: Knizhnaya Letopis', No. 23, Moscow, June 1955, pp. 87-104

DORFMAN, L.A.

USSR/Mechanics - General Mechanics FD-2492

Card 1/1 Pub 85-19/19

Author : Dorfman, L. A.

Title : Note on L. A. Dorfman's article "The Inverse Problem for a Lattice of Profiles", Prikl. Mat. i Mekh., Vol XVIII, No 5, 1954

Periodical : Prikl. Mat. i Mekh., 19, 384, May-June 1955

Abstract : The author states that conditions imposed on the assigned velocity distribution in the earlier article are insufficient for the purpose of obtaining closed profiles. Therefore, observations made on the rigorous solution of the inverse problem were unfounded. The author makes the necessary corrections and thanks G. Yu. Stepanov for pointing out the original errors.

Institution: --

Submitted : --

1-5390. INVESTIGATION OF STEAM TURBINE STAGES WITH FULL AND PARTIAL FEED. Dorfman, L.A. (Energomashinostroenie (Pwr Mach., Leningrad), Oct. 1955, (1), 8-12). From test data obtained, a curve of pressure stages with profiles of the Nevsky Lenin Machine Factory turbine NZL 35G/1 in the whole range of blade heights used is presented in the form of diagrams of efficiency, output and reactance factors, while the loss components of the natural stage — drift and windage losses — are determined in addition to disc friction losses. The tests show that windage losses, in contrast to the Stodola formula, are linearly dependent on blade height.

R.K.H. (209)

APPROVED FOR RELEASE: 07/19/2001 CIA-RDP86-00513R000410930009-5"

DORFMAN, L. A.

"Calculation of Flow Past a Rotating Circular Lattice," by L. A. Dorfman, Leningrad, Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, No 12, Dec 56, pp 121-125.

"The plane flows in rotating circular lattices schematicize flows in the impellers of centrifugal compressors and radial turbines and in conical flows in axial turbomachines."

This work presents a method, supplemented by equations, graphs, and drawings, intended for the calculation of pressure distribution on lattice profiles of any number and any arbitrary shape in which the field of flow is reflected on external lattice blades without loss of accuracy. To increase the accuracy of the calculations, essential singular integrals of the potential speed of flow of displacement, and not the speed itself, were calculated.

Sum 1239

DORFMAN, L. A.

"Conversation of Velocities Along a Profile in a Lattice," by L. A. Dorfman, Leningrad, Inzhenernyy Sbornik, Vol 23, 1956, pp 186-189.

Assuming the distribution of velocities along the profile of a given lattice at some angle of inflow β_1 is known, the distribution of velocities for any other angle of inflow β_1 is found.

The solution of this problem is important in studying turbine profile lattices and comes down to determining the conformed reflection of the exterior of the profile lattice for some canonic range with the given velocity distribution.

The only reference is to a book by L. I. Sedov, Ploskiye Zadachi Gidrodinamiki i Aerodinamiki (Plane Problems of Hydrodynamics and Aerodynamics), Gostekhizdat, 1950. The article was submitted for publication in April 1953.

Sum 1219

24-7-21/28

AUTHOR: Dorfman, L.A. (Leningrad).

TITLE: Turbulent boundary layer on a rotating disc. (Turbulentnyy pogranichnyy sloy na vrashchayushchemsya diske).

PERIODICAL: "Izvestiya Akademii Nauk, Otdeleniye Tekhnicheskikh Nauk" (Bulletin of the Ac.Sc., Technical Sciences Section), 1957, No.7, pp.138-142 (U.S.S.R.)

ABSTRACT: Study of the flow around a rotating disc is of great practical importance, particularly for computing the friction of individual elements of turbines. Comparison of experimental data obtained by Kempf and Schmidt with data calculated according to the formula of Goldstein, S. (2) shows that the latter's results are not in agreement with the experimental data. Therefore, in this paper an attempt is made to arrive at a full solution of the problem on the basis of the speed profile, starting from relations given in the book of Loytsyanskiy, L.G. "Aerodynamics of the boundary layer", 1941. The author claims that the results obtained by means of the equation:

$$c_M = 0.982 \ (\lg N_{Re})^{-2.58},$$

which he derived shows good agreement with available

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Turbulent boundary layer on a rotating disc. (Cont.)

experimental data. There are 3 figures and 5 references,
2/2 2 of which are Slavic. 24-7-21/28

SUBMITTED: December 10, 1956.

AVAILABLE:

DORFMAN, L.A.

24-12-13/24

AUTHOR: Dorfman, L.A. (Leningrad).

TITLE: Influence of the radial temperature gradient on the heat transfer of a rotating disc. (Vliyaniye radial'nogo gradienta temperatur na teplootdachu vrashchayushchegosya diska).

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, 1957, No.12, pp. 64-66 (USSR)

ABSTRACT: An accurate solution of the problem of heating a viscous incompressible liquid by a rotating disc was published in 1947 by I. A. Kibel' (Ref.1). In 1952 this solution was again published by Millsaps, K. and Pohlhausen, K. (Ref.2) who gave results of calculations for low values of the Prandtl number between 0 and 10. These results, as well as those of Wagner (Ref.3), were obtained for the condition that the temperature of the disc and the temperature of the surrounding medium at a large distance from the disc are maintained constant along the radius. Experimental results show higher heat transfer values than those calculated even if the influence of radiation is excluded and this is attributed to the fact that, in addition to natural convection, there was a radial temperature gradient during the tests. Under real

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24-12-13/24

Influence of the radial temperature gradient on the heat transfer of a rotating disc.

conditions of operation of discs of gas turbines and other turbines, the temperature of the disc and the surrounding medium increases along the radius and this imposes the necessity of solving the problem of the influence of the radial temperature gradient on the heat transfer of a rotating disc. To simplify calculations, a quadratic distribution of the temperature along the disc radius is assumed, since such a distribution is near to that observed under real conditions of operation of a gas turbine. For the boundary conditions defined by Eq.(2) solution of the problem involves solving the differential equation, Eq.(3), p.64. The final equation, Eq.(15), indicates that the radial temperature gradient has a considerable influence on the heat transfer. There are one table and 5 references, one of which is Slavic.

SUBMITTED: March 22, 1957.

AVAILABLE: Library of Congress.

Card 2/2

S/112/59/000/013/021/057
A002/A001

Translation from: Referativnyy zhurnal, Elektrotekhnika, 1959, No. 13, p. 32,
26377

AUTHORS: Bychenkov, S. A., Kuznetsov, L. A., Dorfman, L. A., Shkutov, K. G.

TITLE: The Experimental Gas Turbine Plant of NZL

PERIODICAL: Tr. Nevsk. mashinostroit. z-da, 1957 (1958), No. 1, pp. 211-226

TEXT: An experimental gas turbine power plant was built at NZL in 1945-1948. At this plant a single-shaft ГТ-550 (GT-550) unit was installed working on an open cycle with regeneration (550°C gas temperature, 3.5 atm pressure). In 1955, the unit was converted to a ГТ-700 (GT-700) two-shaft installation (700°C gas temperature). The plant was in operation for 2,500 hours with 130 starts. The GT-550 with a capacity of 840-1,000 kw has 5 reaction stages α_1 = const, β_2 = const, u/c_0 = 0.56-0.63. The axial compressor has 16 stages with a 50% reaction. The adjustment of the compressor was performed during the tests. The stage characteristic on which the calculation of the compressor of the industrial ГТ-600-1.5 (GT-600-1.5) was based, was plotted on the basis of these

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The Experimental Gas Turbine Plant of NZL

S/112/59/000/013/021/067
A002/A001

investigations. The nonuniform distribution of temperatures over the turbine casing and great temperature stresses in the rotor bore necessitate a preheating of the installation for 60 - 80 minutes. Characteristics of the turbine unit at different operating conditions are given. Changes of the outside air temperature from +20°C to -20°C do not affect the specific fuel consumption, but the power rises by 1.5 times. The two-shaft GT-700 unit was designed on the basis of the GT-550 by adding a superimposed, single stage turbine with a 700°C inlet temperature and a high-pressure compressor.

V. S. P.

Translator's note: This is the full translation of the original Russian abstract.

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DORFMAN, L.A.

Heat transfer from a rotating disk. Inzh.-fiz. zhur. no. 6:3-11 Je '58. (MIRA 11:7)

1. Nevskiy mashinostroitel'nyy zavod im. V.I.Lenina, Leningrad.
(Disks, Rotating)
(Heat--Radiation and absorption)

DORFMAN, L.A., kand.fiz.-mat.nauk; GRISHCHUK, S.V., inzh.

Studying turbine stages equipped with lamellar guide blades.
Energomashinostroenie 4 no.12:35-37 D '58. (MIRA 11:12)
(Turbines)

DORFMAN, L. A.

AUTHOR: Dorfman, L. A. 57-1-23/30

TITLE: Resistance of a Rugged Disk Rotating in a Housing (Soprotivleniye sherokhovatogo diska, vrashchayushchegosya v kozhukhe).

PERIODICAL: Zhurnal Tekhnicheskoy Fizki, 1958, Vol. 28, Nr 1, pp. 170-172 (USSR)

ABSTRACT: The runners of turbines usually run in small cylindrical spaces. Therefore, formulae for disks rotating in the open space ("free" disk) cannot be used for the computation of resistance of the runners. The consideration as to the reason for the formula for the resistance in a rugged disk rotating in a housing are given and in the following the mentioned formula is compared to the experimental data. On the occasion of the derivation of the formula the author refers to ref. 1 and starts with the given formula for the moment of resistance of a rugged "free" disk. From this he passes on to the case of the disk in the housing. In this connection the characteristic influence of the relative axial gap s/R on the resistance in the case of turbulency is taken into consideration. The experimental data by Pantell (ref.3) are given and finally the wanted formula for the rugged disk rotating in a housing is put up: $(c_M)_{min} = 0{,}051 \left(\frac{k}{R} \right)^{0{,}272}$

Card 1/2 h denotes the degree of roughness, R the radius of the disk,

c_M the coefficient of the moment of resistance. Consequently the experimental data obtained on the occasion of measurings carried out with water whirl brakes with disk construction in the laboratory for turbines at the Nevskiy mashinostroitel'nyy zavod are compared to this formula. It is demonstrated that it agrees with the existing experimental data and that it can be recommended for the computation of the resistance of a disk rotating in a housing at $125 < \frac{R}{k} < 3000$, $0{,}02 \leqslant s/R < 0{,}1$ and $0{,}02 \leqslant a/R < 0{,}1$ at a higher degree of roughness. a/R - radial gap.
There are 3 figures, 4 references, 3 of which are Slavic.

SUBMITTED: April 20, 1957

AVAILABLE: Library of Congress

DORFMAN, L. A.

57-2-25/32

AUTHOR: Dorfman, L. A.

TITLE: The Resistance of a Rotating Rugged Disk (Soprotivleniye vrashchayushchegosya sherokhovatogo diska)

PERIODICAL: Zhurnal Tekhnicheskoy Fiziki, 1958, Vol. 28, Nr 2, pp.380-386 (USSR)

ABSTRACT: The theoretical derivation of the drag formula for a rotating rugged disk under a method of operation where the roughness is entirely effective is derived here. To facilitate the integration of equations for the boundary layer the author approximates several integral quantities by means of dependences according to powers of δ/k_s. δ is the thickness of the boundary layer. k_s is the height of bumps on the rough surface. First, for illustrating the method of calculation, the calculation of the roughness of a small plate is given and then the comparison of the obtained solution with the complete solution of Prandtl-Shlikhting (reference 2). The elements of the turbulent boundary layer at the rotating rugged disk are determined by means of the employment of se-

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miempirical methods in the solution of the momentum equations. The formula calculated for the drag of the rugged disk by means of these methods is in agreement with the results of the tests. The obtained formula for the coefficient of the moment of drag reads:

$$c_M = \frac{M}{\frac{\rho}{2}\omega^2 R^5} = 0,1015\left(\frac{k_s}{R}\right)^{0,268}\left[1 + 0,262\left(\frac{k_s}{R}\right)^{0,086}\right]^{0,365}$$

R denotes the radius of the disk, ρ - the density of the medium in motion, M - the moment of drag of the two sides of the rotating disk with the radius R. This formula can still be reduced:

$$c_M = 0,108\left(\frac{k_s}{R}\right)^{0,272}$$

There are 3 figures, and 5 references, 4 of which are Slavic.

ASSOCIATION: Machine-Building Factory imeni Lenin, Leningrad (Mashinostroitel'nyy zavod im. Lenina, Leningrad)

SUBMITTED: December 4, 1956

AVAILABLE: Library of Congress

Card 2/2

1. Turbulence-Mathematical analysis 2. Boundry layer-Mathematical analysis

20-119-6-14/56

AUTHOR: Dorfman, L. A.

TITLE: Thermal Boundary Layer on a Rotating Disk (Teplovoy pogranichnyy sloy na vrashchayushchemsya diske)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol. 119, Nr 6, pp. 1110 - 1112 (USSR)

ABSTRACT: The author compares the equation of the tagential velocities of an averaged turbulent motion of an incompressible liquid in the boundary layer of a rotating disk

$v_r \frac{\partial v_\varphi}{\partial r} + \frac{v_r v_\varphi}{r} + v_z \frac{\partial v_\varphi}{\partial z} = \frac{\partial}{\partial z}\left(\nu \frac{\partial v_\varphi}{\partial z} - \overline{v_z' v_\varphi'}\right)$ with an energy equation lacking dissipative terms

$v_r \frac{\partial T}{\partial r} + v_z \frac{\partial T}{\partial z} = \frac{\partial}{\partial z}\left(a \frac{\partial T}{\partial z} - \overline{v_z' T'}\right)$.

v_r, v , v_z and T denote the mean values of the velocity components and of temperature, the pulsation components being denoted by dashes. ν denotes the kinematic viscosity and $a = \lambda/c_p \varrho$ - the heat conductivity. In case of a quadratic temperature distri-

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bution at the wall $T_{wall} = r^2$ and at $P = \nu/a = 1$ ($T_\infty = 0$) the profiles of temperature $\Theta(z,r) = T/r$ and of the tangential velocities $G(z,r) = v_\varphi/r\omega$ coincide, the two above given equations taking the same form:

$$v_r \frac{\partial R}{\partial r} + 2R\frac{v_r}{r} + v_z\frac{\partial R}{\partial z} = \frac{\partial}{\partial z}\left(\nu\frac{\partial R}{\partial z} - \overline{v_2' R'}\right); \quad R = G, \Theta.$$

The boundary conditions are also equal then $G(0,r) = \Theta(0,r) = 1$; $G(\infty,r) = \Theta(\infty,r) = 0$, the relations for v_φ and T between the pulsation coefficients and the averaged coefficients being assumed as equal. From this the following relation between the friction stress τ_φ and the heat flow q is determined: $q = c_p \tau_\varphi T_{wall}/r\omega$. The here obtained results also comprises the case of laminar flow, if no pulsation components exist. In the case of turbulent flow the resistive torque M of one face of the disk can be expressed as $M = 0{,}157\ Re^{-0{,}21}(1/4)\rho\omega^2 r^5$ at Reynolds's numbers from 10^5 to 10^7, which yields $Nu = ((dM/dr)/2\pi\omega r^2\mu) = 0{,}0287\ Re^{0{,}8}$. The heat balance was set up for an annular element of the thermal boundary layer for the

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Thermal Boundary Layer on a Rotating Disk 20-119-6-14/56

computation of the heat emission at an arbitrary temperature gradient. From this an integral relation results, having no dissipative terms. This equation is then repeatedly transformed and the further course of computation is pursued step by step. $T_{wall} = r^2$ and $Pr = 1$ $Nu = 0{,}308 \sqrt{(n + 2)Re}$ is obtained for laminar flow, and $Nu = 0{,}0212(n + 2{,}6)^{0{,}2}Re^{0{,}8}$ for turbulent flow. As a conclusion values for the coefficient $Nu/\sqrt{Re}$ are given. There are 5 references, 2 of which are Soviet.

PRESENTED: December 31, 1957, by L. I. Sedov, Member, Academy of Sciences, USSR

SUBMITTED: May 23, 1957

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PHASE I BOOK EXPLOITATION SOV/4323

Dorfman, Lev Abramovich

Gidrodinamicheskoye soprotivleniye i teplootdacha vrashchayushchikhsya tel (Hydrodynamic Resistance and Heat Transfer of Rotating Bodies) Moscow, Fizmatgiz, 1960. 260 p. 5,500 copies printed.

Ed.: S. Kh. Natkovich; Tech. Ed.: Ye. A. Yermakova.

PURPOSE: This book is intended for engineers and researchers working on the industrial application of the hydrodynamics of viscous fluid. It will also be of interest to students and aspirants.

COVERAGE: The book presents a theoretical review of the principles of hydrodynamic resistance and heat transfer from rotating bodies. The basic equations of motion and energy balance, the luminar and turbulent flow around rotating discs, and the rotation of cylinders and axially symmetrical bodies in viscous media are discussed and the experimental results are compared with theoretical solutions. The author thanks Professor L.G. Loytsyanskiy. There is no bibliography but numerous references are made to Soviet, English, and German sources.

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[redacted]

Dorfman, L. A.

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S/024/60/000/03/026/028
E194/E455

AUTHOR: None given

TITLE: The 13th All-Union Scientific Technical Session on Gas-Turbine Manufacture

PERIODICAL: Izvestiya akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Energetika i avtomatika, 1960, Nr 3, pp 183 (USSR)

ABSTRACT: The 13th All-Union Scientific Technical Session on stationary and traction gas-turbines was held in Moscow on the 25th and 26th November 1959. It was convened by the Gas-Turbine Commission of the Academy of Sciences of the USSR, together with the State Scientific Technical Commission of the Council of Ministers of the USSR. Reports were read about the testing and operation of gas turbines ranging from 300 to 12000 kW and on the design of a 50 MW gas turbine. The session was attended by about 400 representatives of Research Institutes, Turbine and Locomotive Works, Design Institutes, Technical Colleges, Councils of National Economy and other institutes. The following reports were read: "Some Results Achieved in the Development of Small Gas-Turbines" by S.Ya.Osherov of the Ekonomayzer Factory.

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The 13th All-Union Scientific Technical Session on Gas-Turbine Manufacture

"Results of Experimental Work of the All-Union Thermo-Technical Institute on the Gas Turbine at the Shatsk Underground Gasification Station of Podzemgaz" by G.G.Ol'khovskiy. "Start-up and Adjustment Experience with Gas-Turbine Type GT-600-1.5 of the Neva Works, Leningrad and some results obtained on it in the Central Boiler Turbine Institute Investigations" by V.G.Tyryshkin of the Central Boiler Turbine Institute. "Adjustment and Operating Experience with Gas Turbines of the Neva Works Leningrad" by L.A.Dorfman of the Neva Engineering Works. "The Production of Fuel for Traction and Stationary Gas-Turbines" by V.Nikolayev of the All-Union Scientific Research Institute of the Oil Industry. "An Experimental Investigation of Problems of the Combustion of Natural Gas in Gas-Turbine Combustion Chambers" by V.A.Khristich of the Kiyev Polytechnical Institute. "An Investigation of the Possibilities of Developing Combustion Chambers for Marine Gas-Turbines using Models" by S.L.Briskin of the Central Scientific

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The 13th All-Union Scientific Technical Session on Gas-Turbine Manufacture

Research Institute imeni A.N.Krylov. "Investigation of Low-Frequency Pulsation in Gas-Turbine Combustion Chambers" by O.V.Dubrovskiy of the Neva Engineering Works. The decisions of the Sessions indicated the main trends in scientific research and experimental work for the period 1960 to 1965.

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DORFMAN, L.A., kand.fiziko-matematicheskikh nauk; KUZNETSOV, A.L., inzh.

Review of I.T.Shvets and E.P.Dyban's book "Air cooling of gas-turbine rotors." Energomashinostroenie 6 no.3:40-45 Mr '60. (MIRA 13:6)

(Gas turbines--Cooling)
(Shvets, I.T.) (Dyban, E.P.)

S/114/60/000/004/003/009
E194/E355

AUTHORS: Dorfman, L.A., Candidate of Physicomathematical Sciences and Kuznetsov, A.L., Engineer

TITLE: Influence of Water Injection on the Intake of the Axial-flow Compressor of a Gas Turbine

PERIODICAL: Energomashinostroyeniye, 1960, No. 4, pp. 12 - 15

TEXT: A compressor output may be increased by wet compression. Injection of a water spray into the compressed air causes the compression process to approach the isothermal, so that the work required to compress 1 kg of air becomes appreciably less than under ordinary conditions. Calculations show that wet compression permits considerable reduction in machine size for a given effective output and if regeneration is used there is an appreciably lower heat consumption for power generation. However, wet compression requires considerable quantities of pure water which is subsequently discharged to atmosphere. Saturated wet compression is, however, an ideal case. In practice, the water drops may be in the

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Influence of Water Injection on the Intake of the Axial-flow Compressor of a Gas Turbine

compressor for only about 0.015 sec, and because of this short-time and the small temperature difference between the drop and the surrounding gas the actual process of wet compression may be very different from the ideal. A method of calculating this difference is briefly described. The effectiveness of wet compression is also impaired by uneven distribution of water drops over the height of the blades resulting from centrifugal force, by impact between the drops and blade surface, and by contamination of the blading by deposits from the water. To make the best use of wet compression it is necessary to have a specially designed meridional profile of the blading.
Work on water injection in the axial-flow compressor of a gas turbine has been described by the Allis Chalmers Company. The hard water used gave considerable deposits on the blading. In view of the lack of experimental data confirming the effectiveness of water injection in an axial-flow compressor

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tests were carried out on the experimental gas turbine type ГТ-550 (GT-550) of the Nevskiy mashinostroitel'nyy zavod (Neva Engineering Works). The axial compressor of this set has 16 stages with 50% reaction, and a stage compression ratio of 3.6; the output is 100 t/h. Water is injected through five mechanical nozzles with a total flow of 1 348 kg/h. The mean drop diameter was estimated to be 40 μ. The distribution of water droplets across the section was studied by measuring the temperature distribution along the radius in several stages, using thermocouples. The graphs show the characteristic bend in the temperature distribution along the blade height. It is due to centrifugal displacement of the water droplets to the periphery, which is accordingly best cooled. There is also a low-temperature zone near the blade roots, where water comes into direct contact with the rotor body and the blade roots. Accordingly, the concentration of

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Influence of Water Injection on the Intake of the Axial-flow Compressor of a Gas Turbine

water droplets is not uniform over the stage section, which reduces the effectiveness of wet compression.
Measurements were made to show changes in the isoentropic efficiency of wet compression. The formulae used are given and the results are plotted. It is found that there is appreciable reduction in efficiency from this cause. Nevertheless, the work expended in compressing one kg of air is lower for wet compression than for dry, even in the worst case. The increase in output of the compressor is also greater than the amount of water injected. This means that the compressor output is increased by wet compression.
After fifty hours of operation with water injection the compressor efficiency measured with dry compression was reduced from 85 to 83% as a result of deposit formation from the water on the blades; later, the rate of efficiency drop diminished. The water hardness was 65 mg/litre. Analysis

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Influence of Water Injection on the Intake of the Axial-flow Compressor of a Gas Turbine

showed that only half the deposits were water-soluble, so washing would be of little use; part of the deposits result from pick-up of oil and from dust in the air. Very slight erosion was observed in the first stages, evidently because the water-particle sizes were not all small enough. From the test results given it is possible to construct compressor characteristics for various amounts of water injection and to calculate the effect of injection on the operation of the gas turbine set as a whole. Calculated curves of power increase and efficiency as compared with dry compression are plotted and the experimental points were close to these curves. It is shown that the greatest increase in output and efficiency is observed with relatively small amounts of water injection, because under such circumstances the isoentropic efficiency of wet compression is reduced comparatively litte. Accordingly, the tests have

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demonstrated the possibility of increasing the output of a gas turbine by injecting water into the compressor intake. The possibilities of such power increases are greatly limited by the reduction in axial velocity of the last stages. When the air temperature is below or near freezing point, water cannot be injected because of icing in the first stages but in hot dry regions, water/injection may be particularly effective. For example, with an air temperature of 35 °C and relative humidity of 40% treatment which reduces the air temperature to 27.2 °C increases the output of the turbine by about 7%. There are 6 figures, 1 table and 8 references: 3 Soviet and 5 non-Soviet.

Acknowledgments are expressed to Candidate of Technical Sciences L. A. Kuznetsov for directing the work and to Engineers K. G. Shkutov, G. A. Kruglikov, L. I. Merkis and A. C. Lebedev for their assistance.

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ZAL'F, Geogriy Arturovich, kand. tekhn. nauk; ZVYAGINTSEV, Vasiliy Vasil'yevich, inzh.; STRAKHOVICH, K.I., prof., retsenzent; DORFMAN, L.A., kand. fiz.-mat. nauk, red.; GOFMAN, Ye.K., red. izd-va; BARDINA, A.A., tekhn. red.

[Thermal calculations of steam turbines] Teplovoi raschet parovykh turbin. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1961. 290 p. (MIRA 14:6)
(Steam turbines)

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S/114/61/000/001/003/009
E194/E355

26.2120

AUTHORS: Bogomazov, R.N., Engineer and Dorfman, L.A., Candidate of Physicomathematical Sciences

TITLE: Experience in the Investigation and Development of Diffuser Tubes for Axial Turbine-type Machines

PERIODICAL: Energomashinostroyeniye, 1961, No. 1, pp. 8 - 12

TEXT: Losses in the gas-air duct, and particularly the performance of the inlet and discharge diffuser tubes of turbines and compressors, have a considerable effect on the efficiency of gas-turbine sets. Data are quoted for typical sets of the Nevskiy mashinostroitel'nyy zavod imeni Lenina (Neva Machine Building Works imeni Lenin) which show that the power gain resulting from proper design of diffusers may be 5%. The optimum geometry of diffuser tubes is then considered. To make diffuser tubes efficient they must be developed in the axial or radial direction, but this is usually limited by other constructional requirements and so the designer has to effect a compromise. For this purpose it is necessary to
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Experience in the Investigation and Development of Diffuser Tubes for Axial Turbine-type Machines

have data about the influence of design parameter of diffuser tubes on their operation. Published recommendations on this subject are inadequate. It is accordingly advantageous to use experience accumulated in neighbouring branches of industrial aerodynamics in seeking an answer to the problem. Data relating to axially symmetrical diffusers with screens proved particularly useful. Tests carried out at the Neva Works imeni Lenin have shown that the main aerodynamic characteristics of screened diffusers can easily be applied to ordinary compressor and turbine-diffuser tubes.

Fig. 2 plots a comparison of results of loss-factor measurements in screened diffusers obtained by M. M. Noseva of TsAGI with loss-factor measurements of the model of a gas turbine diffuser obtained by the Neva works imeni Lenin. Agreement is good. The results show that the losses in diffuser tubes are much influenced by the ratio of the breadth of the tube to the radius at inlet,

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Experience in the Investigation and Development of Diffuser Tubes for Axial Turbine-type Machines

as indicated by curves in Fig. 3. The radius of transfer from the axial to the radial part of the diffuser is also of great importance, as most of the loss occurs in this transitional zone. To improve the flow in the outlet part of the diffuser it is important to select the correct radius of transition from axial to radial flow. If this radius and the breadth are far from the optimum values, annular blades must be placed in the diffuser to reduce the losses.
Design calculations on diffuser tubes used at the Neva Works imeni Lenin are then considered. As the speed in the diffuser tube of stationary gas-turbines is low, compressibility need not be allowed for. In the flow region where there is no breakaway, the flow beyond the boundary layer is not turbulent and the circumferential component of flow speed is zero. This property can be used for a graphical construction of the velocity distribution. Eqs. (1) and (2) provide a basis for a semigraphical construction of flow line and determination of the velocity distribution at the walls.

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A further method used at the Neva Works imeni Lenin to calculate the flow in annular diffusers is based on expression (3). The graphs of Fig. 5 give a comparison between designs of an annular diffuser using the analytical method of Eq. (3) and the approximate semigraphical method, which is seen to have advantages.
Fig. 6 shows the results of flow calculations in curved diffuser tubes of initial and improved variants, where the inner radius of the bend has been increased. Comparison of the calculated pressure distribution on the external walls of the diffuser tube with the experimental value, given in Fig. 7, shows good agreement. The examples given show that the aerodynamic properties of annular diffusers may be calculated and methods of improving them can be suggested. Experimental methods of developing diffuser tubes are then considered. Taking as a basis the calculated shape of diffuser tubes, improvements may be made experimentally within the limits of

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the given overall dimensions. Experimental methods are particularly important when the flow in the diffuser tubes cannot be calculated. Experimental development includes the following steps: determination of the optimum width; determination of the optimum discharge diameter of the diffuser; development of the annular blades and the like necessary to improve the operation of the diffuser.
The application of the results of model tests to full-scale conditions is then considered and the conditions of similarity in addition to geometrical similarity are briefly described. However, more information is required about tests on diffuser pipes of full-scale machines to permit better judgment of the application of model tests to full scale. Tests carried out in full-scale turbines, type ГТ-700-4 (GT-700-4) show that the losses in full-scale diffuser tubes are 20-30% greater than the losses determined from model tests. This may be

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because the operating conditions of the diffuser tube in the last stage of the turbine are different from those of a model diffuser tube tested in a wind tunnel. In particular, swirling of the flow at exit from the last stage has an effect. Whereas some swirling in the axial part of a ring diffuser improves the flow over the outer wall and reduces the losses in the radial part, it may cause breakaway of the flow and increase of losses. Therefore, in the curved annular diffuser there is an optimum amount of swirl. Details of tests on the influence of swirl on the operation of a diffuser tube have been given in an article by Vinnik and others in Energomashinostroyeniye, 1959, No. 4. To obtain a complete picture of the influence of inlet conditions on the operation of the diffuser tube it

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will be necessary to carry out nozzle tests in the presence of a rotating runner and also to make tests on full-scale machines.
There are 9 figures and 6 Soviet references.

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X

29063
S/179/61/000/004/005/019
E191/E435

26.2124

AUTHOR: Dorfman, L.A. (Leningrad)

TITLE: The effect of radial flow between a rotating disc and a casing on their windage torque and heat transfer

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Mekhanika i mashinostroyeniye, 1961, No.4, pp.26-32

TEXT: The problem defined in the title arises in the air cooling of gas turbine rotors by radial blowing and by liquid cooling with the help of screens arranged opposite the disc faces. The need for investigating the effect of radial through-flow on the hydrodynamics of the flow near a disc rotating in a casing arises in studying the operation of centrifugal pumps, compressors, turbines and similar machines. Previously, an approximate solution of the angular momentum equation for the flow near a disc rotating in a casing in the presence of radial through-flow has been solved for material constants not varying with the radius. A more accurate solution is examined using the laws of turbulent flow in pipes and along flat plates. Tests of rotating discs in the presence of radial flow do not reveal boundary layers with a

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potential flow core. It is assumed that the boundary layers at the disc and the casing fill the space between them. The velocity profiles both at the disc and at the casing wall are assumed to follow a power law with the exponent of 1/7. Experimental results lead to the assumption that, for small clearances, the average tangential velocity of the flow through the clearance is equal to the tangential velocity in the middle of the clearance. The equation of motion is solved under these assumptions for the two cases when the cooling medium is fed through the disc or along the shaft. The fluid friction torque and the torque coefficient are stated and compared with experimental results. A comparison of theoretical and experimental velocities in the clearance shows that the agreement is less close at higher through-flows and with larger clearances. An increase of the windage torque with increasing flow of cooling medium is noticeable. It is pointed out that other Russian tests (Ref.2: V.S.Sedach. The kinematics of air cooling a gas turbine disc. Tr. KhPI, 1957, v.XXIV, no.6) obtained with water have given substantially different results due

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apparently to the effect of mass forces. The analysis of the flow is used to derive the heat transfer from the disc. These calculations are compared with other tests (Ref.3: V.M.Kapinos, The heat transfer from the discs of gas turbines with air cooling. Tr. KhPI, 1957, no.6) showing good agreement. The heat transmitted to screens opposite disc faces is computed from the above analysis and compared with extensive tests by B.P.Mironov (Ref.4: Izv. AN SSSR, OTN, Energetika i avtomatika, 1960, no.3), showing good agreement until the clearance becomes excessive. There are 9 figures and 8 Soviet references.

SUBMITTED: January 28, 1961

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28942

S/114/61/000/010/002/005
E194/E155

26.2124

AUTHORS: Dorfman, L.A., Candidate of Phys.Mat.Sciences, and Osherov, Yu.S., Engineer

TITLE: An investigation of air-jet cooling of gas-turbine discs

PERIODICAL: Energomashinostroyeniye, no.10, 1961, 23-26

TEXT: This paper was presented at the 14th Scientific-Technical Session of Komissiya po gazovym turbinam AN SSSR (Commission on Gas Turbines, AS USSR), held March 29, 1961. Gas turbines now produced by NZL use air-jet cooling of the discs, and work was carried out to study the efficiency of this type of cooling. A detailed study was made of an experimental gas turbine type ГТ-700 (GT-700) illustrated in Fig.1. In this figure the inscriptions round the outside give the amount of cooling air injected at each place, in kg/hour. The remaining figures are temperatures. The tests were made at a speed of 5000-6000 r.p.m. with cooling air injected in the following ways: 1) on the rim of the disc from the front through two holes of 8 mm and 11 mm dia;

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An investigation of air-jet cooling S/114/61/000/010/002/005
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2) from the front below the gland on the disc through a single hole of 8 mm dia; 3) on the rear rim of the disc through one hole of 15 mm diameter and six slots of 10 x 10 mm. The instrumentation is described, and some of the experimental results are plotted in Fig.2. The graphs on the left and right show respectively the temperatures of the front and rear faces of the disc. The curve numbers relate to cooling as follows: 1 - only on the rim; 2 - on rim and slots; 3 - on rim and below disc gland; 4 - on front side of disc only; 5 - on rear side of disc only. The points marked by 'x' or by a dot relate respectively to thermocouples attached to the blade roots or to the body of the disc. The shape of the curves obtained is discussed. A study of jet cooling was also made on a production model turbine type ГТ-700-4 (GT-700-4), the disc temperature being measured by fusible inserts. The results, plotted in Fig.4, show that the temperature difference along the radius of a disc between centre and rim is not greater than 50 to 70°C. Methods are available by which the temperature distribution in the disc may be calculated. The methods require a knowledge of the gas temperature in the runner

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and the rate of gas flow, the heat-transfer coefficient from gas to blades and from disc to surrounding medium, the dimensions and physical properties of the material, and finally the temperature of the surrounding medium. The last is particularly difficult to determine and the authors recommend an approximate determination of the disc temperature with the present method of cooling on the basis of generalisation of the experimental results. The following formula is then derived:

$$\theta = 0.0265 \left(\varphi \frac{\mu_g}{\mu_B} \frac{\ell}{b} \sin \beta_2 \right)^{0.7} \left(\frac{R \sqrt{z}}{d} \right)^{0.5} \frac{\lambda_B}{\lambda_g} \tag{8}$$

where: μ_g - gas viscosity; μ_B - air viscosity; ℓ - blade length; b - blade width; R - disc radius; z - heat removed by air jets; d - diameter of air delivery pipe; λ_B - thermal conductivity of air; λ_g - thermal conductivity of gas. The remaining notations are assumed known. In using this formula it should be borne in mind that it is valid for the range of experimental conditions actually used and also for similar designs of disc, frame and cooling system. No interpolation formula has been found for the temperature of the centre of the disc, which loses heat through the shaft as well as by the cooling air. However, altering the delivery of cooling air to the disc rim also alters the centre temperature and if the delivery of cooling air is φ% the following relationship holds:

$$\vartheta = \frac{t_{M.Ц} - t_B}{t_{M.O} - \frac{t_g + t_B}{2}} = A\varphi^{0.275} \qquad (9)$$

where: $t_{M.Ц}$ - temperature of the metal at the centre of the disc; t_B - temperature of the air; $t_{M.O}$ - temperature of the metal at the rim; t_g - temperature of the gas at the blade root.
Values of the coefficient A are 2.5 for a turbine type GT-700-4 and 2.0 for the experimental turbine type GT-700. This formula is approximate and is valid for conditions close to those used in the test. Calculations were made to compare air-jet cooling with cooling by blowing air through gaps in the blade roots. Results show that for the experimental turbine type GT-700 cooling through

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the blade roots is more efficient because only half the amount of air is required to cool the disc to 500 °C. In the case of turbine type GT-700-4, which is of appreciably greater diameter, cooling through gaps in the roots offers no particular advantage. This is presumably because with cooling through the roots the effective cooling surface is proportional to the disc diameter and thickness, whilst with air-jet cooling the effective surface is proportional to the square of the diameter. As air-jet cooling is simpler to arrange and is less subject to clogging by dirt it is clearly to be recommended in certain cases.

Acknowledgments are expressed to Engineer G.A. Kruglikov, Engineer A.S. Lebedev, Candidate of Technical Sciences L.A. Kuznetsov and Candidate of Technical Sciences B.P. Mironov for their assistance.
I.T. Shvets and Ye.P. Dyban are mentioned in the paper for their contributions in the field of gas turbines.
There are 6 figures and 3 Soviet-bloc references.

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5

DORFMAN, L.A.

Temperature distribution around a rotating thermally insulated disc.
Inzh.-fiz. zhur. 4 no. 5 38-43 My '61. (MIRA 14:5)

1. Nevskiy mashinostroitel'nyy zavod imeni V.I.Lenina, Leningrad.
(Thermodynamics) (Laminar flow)

DORFMAN, L.A., kand.fiziko-matematicheskikh nauk; OSHEROV, Yu.S., inzh.

Studying the air-jet cooling of gas turbine disks. Energosmashinostroenie 7 no.10:23-26 O '61. (MIRA 14:10)
(Gas turbine disks--Cooling)

37150
S/179/62/000/001/025/027
E191/E435

/C.1200

AUTHOR: Dorfman, L.A. (Leningrad)

TITLE: Turbulent flow around a rotating cylinder

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye tekhnicheskikh nauk. Mekhanika i mashinostroyeniye. no.1, 1962, 172-173

TEXT: The results of measuring the velocity distribution near two cylinders rotating in free air are given. One cylinder has a diameter of 500 mm and the other of 270 mm. Both lengths are about equal to the respective diameters. Preliminary flow tests have shown the end effects to be negligible and the axial components of velocity to be absent. Non-rotating screens at the cylinder ends had no effect on the results so that their validity for cylinders of infinite length is assumed. The total head of the flow was measured with a pitot tube of 0.8 mm diameter with a bore of 0.5 mm. A round tube of 0.8 mm diameter with side holes of 0.3 mm was used for static pressure measurement. The tubes were 20 mm apart at an equal distance from the cylinder. The results of measurement are given in tables for a range of

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distances: from the 0.5 m dia cylinder at speeds 1456, 2230 and 2840 rpm, and from the 0.27 m diameter cylinder at 2600 and 3920 rpm. The velocity distribution can be represented as in turbulent flow near a flat surface but the curves differ for different cylinder diameters. By introducing a "dynamic velocity" (defined by the friction shear stress) applicable to each radius, all the measurements can be represented by a single plot, which is also independent of the Reynolds number. In the same way, the non-dimensional pressure distribution is independent of cylinder size or Reynolds number. There are 2 figures and 2 tables.

SUBMITTED: November 4, 1961

DORFMAN, L.A. (Leningrad)

Turbulent boundary layer on an axisymmetric body rotating rapidly in an axial flow. Izv.AN SSSR.Otd.tekh.nauk.Mekh. i mashinostr. no.4:18-22 Jl-Ag '62. (MIRA 15:8)
(Boundary layer)

S/170/62/005/005/009/015
B104/B102

26.2120

AUTHOR: Dorfman, L. A.

TITLE: The effect of a transient temperature of a rotating disc on its heat exchange

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, v. 5, no. 5, 1962, 89 - 91

TEXT: In calculating the transient temperature field of the disc of a gas turbine it is usually assumed that the coefficient of heat transfer between the disc and the surrounding medium is independent of variations in the temperature of the disc metal. The error arising from this assumption is here estimated. An example is calculated: for $\dot{T}_w = 7$ deg/sec, $\ddot{T}_w = -0.5$ deg/sec^2 (T_w is the disc temperature), and a speed of $\omega = 500$ sec^{-1} the actual heat-transfer coefficient exceeds the quasi-stationary heat-transfer coefficient by 0.06 %, i. e. the non-steady influence can be ignored. There is 1 figure.

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The effect of a transient ... S/170/62/005/005/009/015
B104/B102

ASSOCIATION: Nevskiy mashinostroitel'nyy zavod imeni V. I. Lenina, g. Leningrad (Neva Institute for the Design and Planning of Machinery Plants imeni V. I. Lenin, Leningrad)

SUBMITTED: June 24, 1961

√B

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DORFMAN, L.A. (Leningrad)

Speed and thermal boundary layers on an axisymmetric body rotating in an unlimited immovable medium. Izv.AN SSSR.Otd.tekh.nauk.Mekh.i mashinostr. no.6:17-24 N-D '62. (MIRA 15:12)
(Boundary layer)

L 18030-63 EPA(b)/EWT(1)/BDS AFFTC/ASD Pd-4

ACCESSION NR: AP3000712 S/0258/63/003/002/0228/0235

AUTHOR: Dorfman, L. A. (Leningrad) 56

TITLE: Laminar boundary layer on rotating bodies of revolution

SOURCE: Inzhenerny*y zhurnal, v. 3, no. 2, 1963, 228-235

TOPIC TAGS: laminar, boundary layer, axisymmetric, drag coefficient, heat transfer

ABSTRACT: The Dorodnitsy*n transformations have been used to study the boundary layer displacement and momentum thicknesses on bodies of revolution rotating in a moving, compressible gas. Throughout the analysis the assumption has been made that the boundary layer thickness is relatively small compared to both the transverse and longitudinal radii of curvature. The transformed differential equations of motion are integrated by the Karman-Pohlhausen momentum integral technique, and numerical results for the drag and heat transfer coefficients are obtained by means of isoclines. A particular example is cited for the case of a rotating semi-infinite cylinder with the flow direction parallel to its

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L 18030-63
ACCESSION NR: AP3000712

O

axis. Orig. art. has: 63 equations and 4 figures.

ASSOCIATION: none

SUBMITTED: 26Feb62 DATE ACQ: 21Jun63 ENCL: 00

SUB CODE: AI NO REF SOV: 003 OTHER: 004

Card 2/2

DORFMAN, L.A. (Leningrad):

"Calculation of the boundary layer occurring on a arbitrary axially symmetric surface rotating in a motionless medium."

report presented at the 2nd All-Union Congress on Theoretical and Applied Mechanics, Moscow, 29 Jan - 5 Feb 64.

L 62545-65 EWP(m)/EWT(1)/FCS(k)/EWA(1) Pd-1/Pi-4 WW

ACCESSION NR: AP5018200 UR/0207/65/000/003/0089/0094

AUTHOR: Dorfman, L. A. (Leningrad)

TITLE: Calculation of a boundary layer formed on an arbitrary axially symmetric surface rotating in a stationary medium

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 3, 1965, 89-94

TOPIC TAGS: boundary layer, viscous flow, similarity solution, approximation [illegible] method, laminar flow, axisymmetric [illegible]

ABSTRACT: A class of similarity solutions is discussed for the boundary layer [illegible] a rotating axisymmetric body of arbitrary shape [illegible] a quiescent fluid. [illegible] system for the problem is given [illegible] figure. The governing boundary layer equations are given for the axisymmetric flow, and a [illegible] solution is shown to exist for the case

$$r = A [illegible] + x_{0})^{m}.$$

[illegible] expression for r and introducing the [illegible] function and [illegible] dimensional coordinates

$$\zeta = z\sqrt{\omega/\nu} \quad [illegible],$$

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L 62545-65

ACCESSION NR: AP5018200

the following set of ordinary equations is obtained

$$F' = F^2 - G^2 + \beta HF', \quad G' = 2FG + \beta HG', \quad H' + 2F = 0,$$

where

$$\beta = \frac{1 + 3m}{4m}.$$

The boundary conditions for the problem are: F(0) = H(0), G(0) = 1, F(∞) = G(∞) = 0. For β = 1, the above solution represents a rotating cone or a rotating [illegible] β [illegible], the solution of the above equations can be obtained in a closed [illegible] the complex plane. To solve the general [illegible] methods are used: [illegible] integration using the Runge-Kutta method [illegible] interpolations [illegible] computer Ural-2 and an approximation method where the changes in the [illegible] layer are given in small increments

$$[illegible]$$

such that between two points, x_1 and x_2, one has

$$\left(\Delta_v + \frac{\theta}{v}\right)_2 = \left(\Delta_v + \frac{\theta}{v}\right)_1 \frac{r_1}{r_2}\left(1 + ZC^{1/m}\right).$$

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L 62547-65

ACCESSION NR: AP5018200

[illegible] the expressions for the skin friction with solutions obtained using [illegible] integral relations, the agreement is found to be go[illegible] [illegible]rig. art. has: 28 equations, 8 figures, and 1 table.

ASSOCIATION: none

[illegible]: [illegible]Jan64 ENCL: 01 SUB CODE: ME, MA

[illegible]: 002 OTHER: 010

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